

REMARKS

Claims 80, 81, 84, 85, 88, 89, 93, 94, 97-99, and 102-106 are amended. Claims 1-79, 82, 83, 86, 87, 90-92, 95, 96, 100, and 101 are cancelled without prejudice to their underlying subject matter. New claims 107-117 are added, without adding new matter. A Request for Continued Examination is filed herewith. All arguments set forth herein are made without prejudice and Applicants' failure to address any specific point made in the Office Action should not be taken as an indication of agreement.

The Office Action (at 2) indicates that Applicants failure to expressly traverse the Examiner's official notice statements in the previous office action in Applicants response thereto is tantamount to an admission by the Applicant that such features are indeed prior art. Applicant takes exception to and expressly disagrees with the Examiner's position. There is no requirement that an applicant must address each and every point made by an Examiner in responding to his/her rejections set for in an office action. The applicant's sole burden is to rebut the Examiner's *prima facie* showing of unpatentability and no more. The Applicant's position is that he has not indicated that any feature of which the Examiner took official notice is considered prior art.

Claims 88, 97, and 102 stand objected to for informalities. In view of the amendment to the claims, these objections are respectfully requested to be withdrawn.

Claims 80-96, 102-104, and 106 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,977,684 ("Hashimoto"). Applicant respectfully traverses this rejection.

Claim 80 defines a method of operating an imager and recites "providing a first row select line and a shared column line for a first pixel of an array, and providing a second row select line and said shared column line for a second pixel of said array adjacent said first pixel, wherein said first pixel and said second pixel are in a row of pixels and do not share a row select line and the first row select line and the second row select line each run along the row of pixels and are not connected to pixels of any other row of the array; activating at least one of the first row select line

and the second row select line to connect the associated one of the first and second pixels with the shared column line; and outputting a signal over the shared column line which is associated with the activated row select line by connecting at least one of the first pixel and second pixel to said shared column line.” This claimed method is not anticipated by Hashimoto.

Hashimoto fails to disclose the totality of features claimed in combination at claim 80, but specifically fails to disclose “wherein said first pixel and said second pixel are in a row of pixels and do not share a row select line,” as recited by the claim. It is clear that in each embodiment of Hashimoto, a row line, e.g., common row select line 40 of Fig. 3, is shared by what would be identified as the first and second pixels of Hashimoto, e.g., identified by their photodiodes 32a and 32b. For this reason alone, Hashimoto does not anticipate.

Also, Hashimoto fails to disclose “activating at least one of the first row select line and the second row select line to connect the associated one of the first and second pixels with the shared column line” and “outputting a signal over the shared column line which is associated with the activated row select line by connecting at least one of the first pixel and second pixel to said shared column line,” either as individual features or in combination as recited by independent claim 80. The first and second row select lines identified in the Office Action (at 5) as being analogous to the recited features, i.e., scanning column lines odd 58 and even 59 of Figs. 9-12, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two pixels. Thus, the two pixels of Hashimoto are not addressed by respective row select lines that connect the pixels to the shared column line for signal output, but instead have respective addressing transfer gate lines, which is different. Transfer gates do not provide a connection for an output signal, but gate the photocharge generated at the photodiode to the pixels’ floating diffusion regions. For at least these reasons, also, Hashimoto does not anticipate independent claim 80.

Claim 81, which depends from independent claim 80 and is patentable for the same reasoning, further recites “the shared column line connects with said first pixel and said second pixel at an S-shaped active area shared between the pixels.” The Examiner identified this as novel

and non-obvious subject matter, specifically in view of Hashimoto and Shinohara (defined below), in allowing the related patent application serial number 11/797,756 (see Notice of Allowance dated July 2, 2009 at 8).¹ Therefore, claim 81 is patentable for this reason also.

Claim 84 defines a method of operating an imager and recites “receiving an image on a pixel array comprising a first pixel and an adjacent second pixel in a row of pixels, a first row select line and a shared column line provided for the first pixel, and a second row select line and said shared column line provided for the second pixel, each of said first and second pixels having a node for receiving photogenerated charges and a circuit for providing an output signal based on charges at said node to said shared column line in response to an associated activated row select line; resetting a voltage level of said node associated with the first pixel to a predetermined voltage using a reset transistor; and activating the first row select line to output a signal from the first pixel to the shared column line.” This claimed method is not anticipated by Hashimoto.

Hashimoto fails to disclose the totality of features claimed in combination at claim 84, but specifically fails to disclose “each of said first and second pixels having a node for receiving photogenerated charges and a circuit for providing an output signal based on charges at said node to said shared column line in response to an associated activated row select line” and “activating the first row select line to output a signal from the first pixel to the shared column line,” either as individual features or in combination as recited by the claim. As was discussed above in relation to the patentability of independent claim 80, the row select lines identified by the Office Action (at 7) as being analogous to those of the claim, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Thus, neither of the two pixels of Hashimoto are addressed by a row select line that upon activation connects the pixel to a shared column line for signal output, but instead the Hashimoto pixels have

¹ The other cited references, Bird and Shinohara (defined below) were also expressly considered by the Examiner in the prosecution of the related application serial number 11/797,756 and the claims were allowed there-over.

respective addressing transfer gate lines. For at least this reason, Hashimoto does not anticipate independent claim 84.

Claim 85 which depends from independent claim 84 and is patentable for the same reasoning, further recites “the shared column line connects with said first pixel and said second pixel at an S-shaped active area shared between the pixels.” The Examiner identified this as novel and non-obvious subject matter, specifically in view of Hashimoto and Shinohara (defined below), in allowing the related patent application serial number 11/797,756 (see Notice of Allowance dated July 2, 2009 at 8). Therefore, claim 85 is patentable for this reason also.

Claim 88 defines an imager and recites “a plurality of pixels for generating charge associated with detected light, the plurality of pixels arranged in rows and columns of an array, each said row having interspersed odd and even pixels, wherein an odd pixel of a row is addressed by an activated odd row select line to provide an output signal on a column line shared with an adjacent even pixel, and wherein the adjacent even pixel of the row is addressed by an activated even row select line to provide an output signal on the shared column line, wherein the even row select line does not address the odd pixels and the odd row select line does not address the even pixels; a column driver to access pixels connected to the shared column line; and a row driver to selectively activate the odd row select line and the even row select line.” This claimed device is not anticipated by Hashimoto.

Hashimoto fails to disclose the totality of features claimed in combination at claim 88, but specifically fails to disclose “wherein an odd pixel of a row is addressed by an activated odd row select line to provide an output signal on a column line shared with an adjacent even pixel, and wherein the adjacent even pixel of the row is addressed by an activated even row select line to provide an output signal on the shared column line,” either as individual features or in combination as recited by the claim. As was discussed above in relation to the patentability of independent claim 80, the row select lines identified by the Office Action (at 10) as being analogous to those of the claim, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates

53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that upon activation connects the pixel to a shared column line for signal output, but instead the Hashimoto pixels have respective addressing transfer gate lines. For at least this reason, Hashimoto does not anticipate independent claim 88.

Claim 89 which depends on independent claim 88 and is patentable for the same reasoning, further recites “the column line connects with said odd pixel and said even pixel at a respective S-shaped active area shared between the odd and even pixels.” The Examiner identified this as novel and non-obvious subject matter, specifically in view of Hashimoto and Shinohara (defined below), in allowing the related patent application serial number 11/797,756 (see Notice of Allowance dated July 2, 2009 at 8). Therefore, claim 89 is patentable for this reason also.

Claim 93 defines a method of operating an imager and recites “providing a first row select line exclusively for first pixels of a row of pixels and a second row select line exclusively for second pixels of the row of pixels, wherein said first and second row select lines connect said first and second pixels to respective ones of a plurality of shared column lines, which are each shared by adjacent first and second pixels, when the first and second row select lines are respectively activated, wherein the first row select lines do not address any second pixel and the second row select lines do not address any first pixel; addressing the first pixels using a row driver coupled to the first row select line; providing a first output signal associated with light detected by the first pixels to the respective ones of the plurality of shared column lines by activating the first row select line; addressing the second pixels using the row driver coupled to the second row select line; and providing a second output signal associated with light detected by the second pixels to the respective ones of the plurality of shared column lines by activating the second row select line.” This claimed method is not anticipated by Hashimoto.

Hashimoto fails to disclose the totality of features claimed in combination at claim 93, but specifically fails to disclose “first and second row select lines connect said first and second pixels to respective ones of a plurality of shared column lines, which are each shared by adjacent

first and second pixels, when the first and second row select lines are respectively activated” and “providing a first output signal associated with light detected by the first pixels to the respective ones of the plurality of shared column lines by activating the first row select line,” and “providing a second output signal associated with light detected by the second pixels to the respective ones of the plurality of shared column lines by activating the second row select line,” either as individual features or in the recited combination of features. As was discussed above in relation to the patentability of independent claim 80, the row select lines identified by the Office Action (at 12) as being analogous to those of the claim, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that upon activation connects the pixel to a shared column line for signal output, but instead the Hashimoto pixels have respective addressing transfer gate lines. For at least this reason, Hashimoto does not anticipate independent claim 93.

Claim 94 which depends on independent claim 93 and is patentable for the same reasoning, further recites “the shared column lines connect with respective pairs of said first pixels and said second pixels at respective S-shaped active areas shared between the respective pairs of first and second pixels.” The Examiner identified this as novel and non-obvious subject matter, specifically in view of Hashimoto and Shinohara (defined below), in allowing the related patent application serial number 11/797,756 (see Notice of Allowance dated July 2, 2009 at 8). Therefore, claim 94 is patentable for this reason also.

Claim 102 defines an imager and recites “a pixel array comprising a row of first pixels and second pixels; a first circuit for the first pixels comprising a first row select line for connecting the first pixels with respective ones of a plurality of shared column lines; and a second circuit for the second pixels comprising a second row select line for connecting the second pixels with said respective ones of said plurality of shared column lines, wherein the first row select lines do not address the second pixels and the second row select lines do not address the first pixels, each of the

shared column lines being associated with a first pixel and a second pixel.” This claimed device is not anticipated by Hashimoto.

Hashimoto fails to disclose the totality of features claimed in combination at claim 102, but specifically fails to disclose “a first row select line for connecting the first pixels with respective ones of a plurality of shared column lines” and “a second row select line for connecting the second pixels with said respective ones of said plurality of shared column lines,” either as individual features or in the recited combination of features. As was discussed above in relation to the patentability of independent claim 80, the row select lines identified by the Office Action (at 14) as being analogous to those of the claim, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that connects the pixel to a shared column line for signal output, but instead Hashimoto’s pixels have respective addressing transfer gate lines. For at least this reason, Hashimoto does not anticipate independent claim 102.

Claim 105 which depends on independent claim 102 and is patentable for the same reasoning, further recites “each pair of first and second pixels are connected by a substantially diagonal active area such that the paired pixels are laid out in an S-shape.” The Examiner identified this as novel and non-obvious subject matter, specifically in view of Hashimoto and Shinohara (defined below), in allowing the related patent application serial number 11/797,756 (see Notice of Allowance dated July 2, 2009 at 8). Therefore, claim 105 is patentable for this reason also.

Claim 106 defines an imager and recites “a row of pixels comprising a first plurality of pixels and a second plurality of pixels; a first address circuit for the first plurality of said pixels and a second address circuit for the second plurality of said pixels, said first address circuit comprising a first row select line and a plurality of shared column lines, and said second address circuit comprising a second row select line and said plurality of shared column lines, wherein the first row select lines do not address the second plurality of pixels and the second row select lines do not address the first plurality of pixels, each of said plurality of shared column lines being connected to

a respective first pixel of the first plurality of pixels and a respective second pixel of the second plurality of pixels by the first row select line and the second row select line; and a reset line connected to at least the first plurality of pixels or the second plurality of pixels.” This claimed device is not anticipated by Hashimoto.

Hashimoto fails to disclose the totality of features claimed in combination at claim 106, but specifically fails to disclose “each of said plurality of shared column lines being connected to a respective first pixel of the first plurality of pixels and a respective second pixel of the second plurality of pixels by the first row select line and the second row select line,” either as individual features or in the recited combination of features. As was discussed above in relation to the patentability of independent claim 80, the row select lines identified by the Office Action (at 15-16) as being analogous to those of the claim, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that connects the pixel to a shared column line for signal output, but instead have respective addressing transfer gate lines. For at least this reason, Hashimoto does not anticipate independent claim 106.

Because Hashimoto does not anticipate independent claims 80, 84, 88, 93, 102, or 106, these claims and each dependent claim therefrom is patentable over the reference. Dependent claims are also not anticipated and are patentable for other reasons. Applicant respectfully requests that the 35 U.S.C. § 102(e) rejection of claims 80-96, 102-104, and 106 be withdrawn and the still-pending claims allowed.

Claims 97-101 and 105 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashimoto in view of U.S. Patent 6,130,423 (“Brehmer”), U.S. Patent 5,721,422 (“Bird”), and U.S. Patent 5,587,738 (“Shinohara”). Applicant respectfully traverses this rejection.

Claim 97 defines an imager and recites “a row comprising a first pixel and a second pixel; the first and second pixels being joined by a common active area component; a column line connected with the first and second pixels at the common active area component, wherein said

common active area component is diagonal where it connects the first pixel and the second pixel with respect to the column line; a first row select line for connecting the first pixel with the column line to allow an output signal to be transferred from the first pixel to the column line; and a second row select line for connecting the second pixel with the column line to allow an output signal to be transferred from the second pixel to the column line, wherein the first row select line does not address the second pixel and the second row select line does not address the first pixel.” This claimed device is not taught or suggested by the Hashimoto-Brehmer-Bird-Shinohara combination.

The Hashimoto-Brehmer-Bird-Shinohara combination fails to teach or suggest the totality of features claimed in combination at claim 97, but specifically fails to disclose “said common active area component is diagonal where it connects the first pixel and the second pixel with respect to the column line.” None of the cited references discloses this diagonal aspect of the connecting/shared active area in relation to the column line. In the primary reference, Hashimoto, no pixel active area is shown to be diagonal relative to the vertical signal line (e.g., 37 of Fig. 3 and 57 of Fig. 10). In Brehmer, no specific active area layout is taught or suggested. In Bird, all active areas are at parallel and orthogonal angles relative to the column conductor (e.g., 11 of Fig. 5). In Shinohara, while a portion of the shown active area of Fig. 2 may be considered “diagonal,” the pixels are not “joined by a common active area component,” as shown in Shinohara Fig. 3, which illustrates that there is no shared active area between pixels that could be considered this diagonal feature as claimed. For this failure of the Hashimoto-Brehmer-Bird-Shinohara combination, the subject matter of claim 97 is patentable.

Furthermore, the Hashimoto-Brehmer-Bird-Shinohara combination also fails to teach or suggest “a first row select line for connecting the first pixel with the column line to allow an output signal to be transferred from the first pixel to the column line” and “a second row select line for connecting the second pixel with the column line to allow an output signal to be transferred from the second pixel to the column line,” as individual or combined features, as recited by independent claim 97. As was discussed above in relation to the patentability of independent claim 80, the row select lines identified by the Office Action (at 17) as being analogous to those of the claim, i.e.,

scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that connects the pixel to a shared column line for signal output, but instead have respective addressing transfer gate lines. None of the other cited references disclose such a dual-row select line configuration for connecting first/second pixels with a column line to output a signal from the pixels. For at least this reason, independent claim 106 is patentable over the Hashimoto-Brehmer-Bird-Shinohara combination.

Regarding claim 99, which depends on independent claim 97 and is patentable for the same reasoning, further recites “the common active area component and the first and second pixels are laid out in an S-shape.” The Examiner identified this as novel and non-obvious subject matter, specifically in view of Hashimoto and Shinohara (defined below), in allowing the related patent application serial number 11/797,756 (see Notice of Allowance dated July 2, 2009 at 8). And, as noted above at note 1, the Examiner also expressly considered the other references, Bird and Brehmer, in allowing the claims of the ‘756 application. Therefore, claim 99 is patentable for this reason also.

Claim 105 depends from independent claim 102, discussed above as patentable over Hashimoto alone. Combining Brehmer, Bird, and Shinohara with Hashimoto cannot remedy the deficiencies of Hashimoto and would not render the claimed subject matter obvious.

As discussed above in relation to the patentability of independent claim 102, the primary reference Hashimoto fails to teach or suggest “a first row select line that connects the first pixels with a plurality of shared column lines” and “a second row select line that connects the second pixels with said plurality of shared column lines,” either as individual features or in the recited combination of features. As was discussed above in relation to the patentability of independent claim 80, the row select lines identified by the Office Action (at 22-23) as being analogous to those of the claim, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are

addressed by a row select line that connects the pixel to a shared column line for signal output, but instead have respective addressing transfer gate lines. None of the other cited references disclose such a dual-row select line configuration for connecting first/second pixels with a column line to output a signal from the pixels. For at least this reason, claim 105 is patentable over the Hashimoto-Brehmer-Bird-Shinohara combination.

New claims 107-117 have been added. Although the Examiner has not had an opportunity to review these claims yet, Applicant shall address their patentability over the cited art.

Claim 107 defines pixel array and recites, in part, "said first row select line controls a signal output switch for a plurality of first pixels of said row" and "aid second row select line controls a signal output switch for a plurality of second pixels of said row." No such pixel array is taught by Hashimoto, Brehmer, Bird, or Shinohara, whether taken individually or in combination. As discussed above, the row select lines identified by the Office Action as being analogous to those of the claims, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that provides a switch for an output signal. None of the other cited references disclose such a dual-row select line configuration for connecting first/second pixels to output a signal from the pixels. For at least this reason, independent claim 107 is patentable over Hashimoto, Brehmer, Bird, and Shinohara.

Claim 109 defines a pixel array and recites, in part, "an odd output selection circuit for connecting an odd column pixel of the row to a column output line" and "an even output selection circuit for connecting an even column pixel of the row to the column output line." No such pixel array is taught by Hashimoto, Brehmer, Bird, or Shinohara, whether taken individually or in combination. As discussed above, the row select lines identified by the Office Action as being analogous to those of the claims, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that provides a switch for an output signal to

a column output line. None of the other cited references disclose such a dual-row select line configuration for connecting first/second pixels to output a signal from the pixels. For at least this reason, independent claim 109 is patentable over Hashimoto, Brehmer, Bird, and Shinohara.

Claim 111 defines a pixel array and recites, in part, “a first pixel output selection switch configured to connect the output signal of the first source follower transistor to an output line” and “a second pixel output selection switch configured to connect the output signal of the second source follower transistor to the output line, wherein the output line is shared between the first pixel and the second pixel.” No such pixel array is taught by Hashimoto, Brehmer, Bird, or Shinohara, whether taken individually or in combination. As discussed above, the row select lines identified by the Office Action as being analogous to those of the claims, i.e., scanning column lines odd 58 and even 59, are the controlling lines for the transfer gates 53, M_{TX1} and M_{TX2} for the two Hashimoto pixels. Neither of the two pixels of Hashimoto are addressed by a row select line that provides a switch for an output signal to a column output line. None of the other cited references disclose such a dual-row select line configuration for connecting first/second pixels to output a signal from the pixels. For at least this reason, independent claim 111 is patentable over Hashimoto, Brehmer, Bird, and Shinohara.

Claim 113 defines an imager structure and recites, in part, “an active area spanning between a first photodetector of the first pixel and a second photodetector of the second pixel but no other photodetectors” and “a common output for charges generated from the first photodetector and the second photodetector at a portion of said active area between said first and second photodetectors, the common output being coupled to a column line shared by the first pixel and the second pixel, wherein the portion of said active area to which the common output is connected is configured diagonally with respect to an extending direction of said column line within the pixel array.” None of the cited references discloses this diagonal aspect of the connecting/shared active area in relation to the column line. In Hashimoto, no pixel active area is shown to be diagonal relative to the vertical signal line (c.g., 37 of Fig. 3 and 57 of Fig. 10). In Brehmer, no specific active area layout is taught or suggested. In Bird, all active areas are at parallel and orthogonal

angles relative to the column conductor (e.g., 11 of Fig. 5). In Shinohara, while a portion of the shown active area of Fig. 2 may be considered “diagonal,” the pixels do not share the diagonal active area, as shown in Shinohara Fig. 3. For at least this reason, independent claim 113 is patentable over Hashimoto, Brehmer, Bird, and Shinohara.

Claim 115 defines a pixel array and recites, in part, “the first photodetector shares an active area with the second photodetector and no other photodetector, said shared active area providing an output for said first and second photodetectors” and “a common readout line for receiving a signal from said first and second photodetectors the active area shared by the first pixel and the second pixel, wherein the shared active area is oriented diagonally relative to an extending direction of the common readout line across the pixel array.” None of the cited references discloses this diagonal aspect of the connecting/shared active area in relation to the column line. In Hashimoto, no pixel active area is shown to be diagonal relative to the vertical signal line (e.g., 37 of Fig. 3 and 57 of Fig. 10). In Brehmer, no specific active area layout is taught or suggested. In Bird, all active areas are at parallel and orthogonal angles relative to the column conductor (e.g., 11 of Fig. 5). In Shinohara, while a portion of the shown active area of Fig. 2 may be considered “diagonal,” the pixels do not share the diagonal active area, as shown in Shinohara Fig. 3. For at least this reason, independent claim 115 is patentable over Hashimoto, Brehmer, Bird, and Shinohara.

Claim 117 defines a pixel array and recites, in part, “said first photodetector shares an active area with said second photodetector and no other photodetector and at least one of said first pixel and said second pixel further comprises a reset transistor, said reset transistor comprising a gate, a first source/drain region, and a second source drain region linearly arranged, wherein said shared active area between the first and second photodetectors has a diagonal orientation relative to the linear arrangement of the reset transistor; and a common readout line for receiving charge from said shared active area.” None of the cited references discloses this diagonal aspect of the connecting/shared active area in relation to the components of a reset transistor. In Hashimoto, no pixel active area is shown to be diagonal relative to the reset transistor (e.g., M_{RES} of Figs. 9 and

10). In Brehmer, no specific active area layout is taught or suggested. In Bird, no specific reset transistor is identified, but, in any event, all active areas are at parallel and orthogonal angles relative to all shown transistors. In Shinohara, while a portion of the shown active area of Fig. 2 may be considered "diagonal," the pixels do not share the diagonal active area, as shown in Shinohara Fig. 3. In any event, no specific reset transistor is identified by Shinohara. The closest this reference comes to such is control gate 49 of Figs. 2 and 3, but this gate is used *with* the "diagonal" active area to form a possible reset transistor and, therefore, cannot satisfy the claim feature. For at least this reason, independent claim 117 is patentable over Hashimoto, Brehmer, Bird, and Shinohara.

In view of the above, Applicant believes the pending application is in condition for allowance. A notice of allowance for all pending claims is respectfully requested.

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Respectfully submitted,

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